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LETTER REGARDING REGULATORY REVIEW AND ACCEPTANCE OF FINAL DRAFT FOCUSED FEASIBILITY STUDY AT OPERABLE UNIT 4 (OU 4) NTC ORLANDO FL
3/13/1997
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

FLORIDA

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

March 13, 1997

09.01.04.0005
00304

Mr. Wayne Hansel
Code 18B7
Southern Division
Naval Facilities Engineering Command
P.O. Box 190010
North Charleston, South Carolina 29419-0068

RE: Final Draft Focused Feasibility Study, Operable Unit 4, Naval Training Center Orlando.

Dear Mr. Hansel:

I have completed the technical review of the subject document dated February 1997 (received February 24, 1997). The document is adequate for its intent. Also, please consider the comments presented by Greg Brown, P.E., in the attached memorandum. I am including a copy of the memorandum mentioned in Greg's comment No. 4.

If I can be of any further assistance with this matter, please contact me at (904) 921-9989.

Sincerely,

John W. Mitchell
Remedial Project Manager

cc: Barbara Nwokike, SouthDiv
Lt. Gary Whipple, NTC Orlando
Nancy Rodriguez, USEPA Region 4
Bill Bostwick, FDEP Central District
John Kaiser, ABB Environmental, Orlando
Mac McNeil, Bechtel Environmental, Knoxville
Steve McCoy, Brown and Root, Oak Ridge
Patricia Kingcade, OGC/Trustee File

TJB TJB JJC JJC ESN ESN

Memorandum

Florida Department of
Environmental Protection

TO: John Mitchell, Remedial Project Manager, Technical Review Section

THROUGH: Tim Bahr, P.G., Supervisor, Technical Review Section TB

FROM: Greg Brown, P.E., Professional Engineer II, GB Technical Review Section

DATE: March 12, 1997

SUBJECT: Final Draft Feasibility Study, Operable Unit 4, Naval Training Center Orlando, FL.

I reviewed the subject document dated February 1997 (received February 24, 1997). I agree with the general conclusions and recommendations reported in the document. The document is adequate for its intent. I have some minor comments that your team should consider as you move forward with implementation of remedial strategies.

1. The RAO states the remedy's intent is "to gain control over the migration pathways." Although this generality provides flexibility, future confusion will be avoided when judging success if the RAO is defined more specifically. There are places in the document where detailed objectives become explicit. For example, Section 2.2., page 2-5, states, "if groundwater containing total VOCs greater than 100 ug/l were intercepted or controlled, the concentrations of VOCs in the lake would most likely decrease over time". Further, Section 5.2, page 5-2, states, "hydraulic control over the portion of the aquifer with total VOCs greater than 100 ug/l should be obtained." The RAO would be more rigorous if these concepts of a cleanup goal, exposure pathways, receptors, and containment were included.

2. Figure 1-2 is an excellent presentation of the major decision points in the project. The logic of the "Investigative approach secondary" however, may be flawed and should be reviewed by the authors. For example, the end point for the "If GW excessively contaminated only" is "Refine fate and transport" with no subsequent steps.

3. Figure 1-3 implies that the southern boundary of the VOC groundwater plume is not defined although the extent of contamination above target cleanup goals appears to be known. If this is true, what are the risks if any of not defining the full extent of groundwater contamination?

4. The report states that air emissions should not be a concern but appropriate controls will be implemented if monitoring data warrants it. No quantitative data or analysis was included to support this conclusion. I had called Alan Zahm, P.E., ARM, in the FDEP Orlando District (SUNCOM 325-3335) in October 1996 to discuss District air permitting criteria for a site at Cape Canaveral similar to OU4. He said that the District follows the RAP memorandum (May 1996 authored by the Division heads Mr. Ruedell and Mr. Rhodes) for guidance on waste cleanup sites. If we are consistent with that memorandum, my work plan engineering certification will suffice as the air permit. To insure the District's confidence and prevent possible conflicts, the Navy should follow the guidance in the referenced memorandum to justify their air emissions control strategies.

If you have any questions, call me at (904) 488-3935.

Memorandum Jim Crane

Florida Department of Environmental Protection

DARM-OGG-03
Revised

BUREAU OF WASTE CLEANUP

MAY 23 1996

TECHNICAL REVIEW SECTION

TO: Bureau of Waste Cleanup
Bureau of Air Regulation
District Waste Program Administrators
District Air Program Administrators
District Waste Cleanup Supervisors
District Tanks Supervisors
Local Program Tank Supervisors
Local Air Program Administrators

FROM: John M. Ruddell, Director JMR
Division of Waste Management

Howard L. Rhodes, Director
Division of Air Resources Management

DATE: May 17, 1996

SUBJECT: Revised Guidance on Air Emissions from Petroleum Cleanup Sites

This guidance replaces the February 27, 1996 Guidance, DARM-OGG-03.

This memorandum provides guidance for evaluation of air emissions that will result from the cleanup of petroleum contaminated sites. This guidance replaces all previous guidance memoranda related to air emissions evaluation and control for groundwater treatment air strippers and vacuum extraction systems at petroleum contaminated sites.

The Bureau of Waste Cleanup is responsible for the cleanup of many petroleum contaminated sites throughout the state. The cleanup systems on these sites will not be identical but will have similarities as far as considerations for air emissions control and evaluation. It is the intent to avoid duplicate efforts by Air and Waste Cleanup program staff in the evaluation of these cleanup systems. Therefore, the staff of the Bureau of Waste Cleanup and contracted local program offices will evaluate air emissions sources from existing and proposed petroleum contaminated site cleanup systems in accordance with the provisions of this memorandum. Provided that systems are designed and operated in accordance with the terms of this memorandum, the Remedial Action Plan Approval Order will serve as evidence that air emissions concerns have been adequately addressed. No separate air permit will be required for the operation of the cleanup system, as long as the procedures outlined in this memo for air emissions evaluation, treatment, and monitoring are followed unless the soil remediation unit is located at a facility that is a Title V source. If the unit is at a Title V source, it should be reported as an emissions unit and should be included in the Title V permit pursuant to Rules 62-213.420 and 440, F.A.C.

It is assumed that air emissions sources associated with petroleum cleanup sites will be temporary in nature, that is, will be operated less than 5 years. The Remedial Action Plan must include an estimate of the site cleanup duration. If the cleanup is projected to last greater than 5 years, the District Air Program Administrator must be contacted to obtain an air permit or an exemption under the provisions of Chapter 62-4, F.A.C.

The maximum air emissions from a cleanup site may not exceed 15 pounds per day of volatile organic compounds (VOCs), as determined by EPA Method 18 or other methods with prior approval of the Division of Air Resources Management and the Division of Waste Management. When several technologies are used together on a cleanup site, the air emissions from the multiple sources must be considered together in determining the combined air impacts from the site cleanup activities and the need for air emissions control. The emissions may be determined by direct measurement of the air stream for vapor extraction systems or on the basis of mass transfer of hydrocarbons from water phase to air phase in an air stripper system.

Recent years have seen the development of several new approaches to site cleanup. These processes each have different air emissions potentials and concerns due to the nature of the site cleanup process. A brief description of each process and the air emissions evaluation and control procedures for the process are described individually below.

<u>Vapor extraction</u>

Soil vapor extraction (SVE) or vacuum extraction is an accepted and proven technique for removing volatile organic compounds from the unsaturated zone of soils. The process typically involves several screened vacuum extraction lines, installed either vertically or horizontally, that are manifolded together to a single mechanical equipment system. In this technology, a vacuum is applied to the soil matrix to create a negative pressure gradient that causes movement of vapors toward the extraction wells. Vacuum extraction systems, as distinguished from bioventing systems, typically have relatively high vacuums and air flow rates. These systems primarily remediate soil by causing the volatilization of hydrocarbons adsorbed to soil through the induced vacuum and air flow through the soil. These systems are more effective on lighter petroleum products that are composed predominantly of compounds with higher vapor pressures. The remediation typically removes the greatest mass of VOCs and results in highest concentrations of recovered vapors in the first few days or weeks of operation.

The equipment system typically consists of a blower to create a vacuum, a knock out tank to reduce moisture, an air emissions treatment device, and valves, pressure gauges and air flow meters. Several variations of air emissions devices may be used, including activated carbon, catalytic oxidation, thermal oxidation or a biofilter. The type of air emissions treatment equipment selected will depend on anticipated air flow rates and VOC concentrations.

Vacuum extraction systems will generally be proposed where sites have soils excessively contaminated with VOCs. At such sites, due to the relatively high rates of hydrocarbon recovery in the early stages of vacuum extraction system operation, air emissions control at startup is generally mandatory. The Bureau of Waste Cleanup will consider site specific considerations if there are no excessively contaminated soils present or it is determined the petroleum hydrocarbons present will not be readily volatilized. The air emissions treatment device shall continue operation for the first 30 days of the vacuum extraction system operation. At the end of 30 days, air samples of recovered vapors shall be collected from the recovered vapor air stream without the air emissions treatment device. The air emissions, after controls, must be less than 15 pounds per day. Samples shall be collected in a tedlar bag and analyzed by EPA Method 18 or other methods, with prior approval of the Division of Air Resources Management and the Division of Waste Management, to determine total VOC concentrations. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the measured air flow rate. If the recovered VOCs (including any other emission sources from the site remediation) are less than 15 pounds per day without controls, air emissions treatment may be discontinued. If the recovered VOCs are 15 pounds per day or greater, the air emissions control shall continue until subsequent samples demonstrate the VOC air emissions are less than 15 pounds per day.

Bioventing

Bioventing is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents adsorbed to soils in the vadose zone. The activity of the indigenous bacteria is enhanced by inducing flow of air (to supply oxygen for microorganism metabolism) through the unsaturated zone. The system design is similar to a vacuum extraction system in that there will be extraction (or injection) wells manifolded to an equipment system which includes a blower. The system design is different from soil vacuum extraction, however, in that air flow rates are generally much lower and air may be either injected to the unsaturated zone or withdrawn by applying a vacuum. Bioventing is most often used at sites with mid-weight petroleum products such as diesel fuels and jet fuel because lighter fuels such as gasoline tend to volatilize readily and can be removed more rapidly with soil vapor extraction.

Because this process relies on degradation of petroleum hydrocarbons by microorganisms rather than volatilization, air emissions control is not required. To qualify as bioventing and operation without air emissions control, the Remedial Action Plan must demonstrate that the remediation mechanism will be primarily biodegradation and must show that the uncontrolled air emissions are less than 15 pounds per day. This will generally necessitate the performance of a pilot study and subsequent system design (air flow rates) based on respiration rates established from the pilot study. Additionally, if the site is gasoline contaminated, startup air samples shall be obtained to verify no significant recovery of vapors by the system operation.

In-situ Sparging

In-situ air sparging is an in-situ remedial technology that reduces concentrations of volatile constituents in petroleum products that are adsorbed to soils in the saturated zone and dissolved in the groundwater. This technology involves the injection of contaminant-free air into the subsurface saturated zone, enabling a phase transfer of hydrocarbons from dissolved state to a vapor phase. The air is then vented through the unsaturated zone. Soil vapor extraction is used in conjunction with in-situ sparging to recover the volatilized hydrocarbons. Air sparging is generally more applicable to the lighter petroleum constituents and therefore most effective on gasoline contaminated sites. There is evidence to show that in-situ bioremediation may also be induced during in-situ sparging, however, for the purpose of this discussion it is assumed that the remediation mechanism is predominantly volatilization of petroleum hydrocarbons. A separate section below describes "biosparging" as a distinct process with different air emissions control considerations.

In-situ sparging systems are required to be operated in conjunction with a soil vapor extraction system and the soil vapor extraction system is required to have an air emissions treatment system at system startup due to the relatively high rates of hydrocarbon recovery in the early stages of in-situ sparging and vacuum extraction system operation. The air emissions treatment device shall continue operation for the first 30 days of the in-situ sparging and vacuum extraction system operation. At the end of 30 days, air samples of recovered vapors shall be collected from the recovered vapor air stream without the air emissions treatment device. The air emissions, after controls, must be less than 15 pounds per day. Samples shall be collected in a tedlar bag and analyzed by EPA Method 18 or other methods with prior approval of the Division of Air Resources Management and the Division of Waste

Management to determine total VOC concentrations. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the measured air flow rate. If the recovered VOCs (including any other emissions sources from the site remediation) are less than 15 pounds per day without controls, air emissions treatment may be discontinued. If the recovered VOCs are 15 pounds per day or greater, the air emissions control shall continue until subsequent air samples demonstrate the recovered vapors are less than 15 pounds per day uncontrolled.

Biosparging

Biosparging is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents in the saturated zone. In biosparging, air and nutrients (if needed) are injected into the saturated zone to increase the biological activity of the indigenous microorganisms. The biosparging process is similar to in-situ air sparging. However, while in-situ air sparging removes constituents primarily through volatilization, biosparging promotes biodegradation of constituents rather than volatilization. Biosparging systems will typically have lower air flow rates designed on the basis of providing adequate oxygen supply to optimize biological activity without causing significant volatilization of hydrocarbons.

A biosparging system may be operated along with a bioventing system, a soil vapor extraction system, or with no soil venting system at all. This will depend to a large degree on the extent and nature of contamination of the unsaturated zone. If the extent of contamination to the unsaturated zone is not great enough to warrant any soil remediation system, no soil venting system is required to be operated with biosparging. If the extent of soil contamination warrants a soil remediation system, either vapor extraction or bioventing may be operated in conjunction with biosparging. If a vapor extraction system is proposed, the air emissions control and evaluation procedures described above under "soil vapor extraction" are applicable. If a bioventing system is proposed and the RAP demonstrates that both the biosparging system and bioventing systems will be predominantly bioremediation mechanisms and are designed on the basis of respiration rates of microorganisms, no air emissions control is required if it can be shown that the uncontrolled air emissions are less than 15 pounds per day.

Air Stripping of Recovered Groundwater

Air stripping in the context of this memo refers to any process in which dissolved hydrocarbons in recovered groundwater are transferred from dissolved phase to air phase through mechanical processes. The most common types are packed tower air strippers, aeration tanks, or tray-type aerators. Typically the recovery rate of hydrocarbons dissolved in groundwater results in a relatively low air emissions impact compared with the vacuum extraction and in-situ sparging technologies discussed above. The Department's experience is that air stripping of recovered groundwater generally results in relatively low air emissions that do not require treatment. The evaluation is to be based on the concentration of total volatile organic aromatics (VOAs) in recovered groundwater as determined by EPA Method 602. It shall be assumed that the results of the 602 analysis (BETX) represents 10 percent of the total VOCs. Considering the relatively low effluent standards for most treated groundwater disposal options, it should be assumed that all VOCs measured in groundwater are converted to the air phase. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the design groundwater recovery rate. If the recovered VOCs (including any other emissions sources from the site remediation) are less than 15 pounds per day, air emissions treatment is not necessary. If the recovered VOCs are 15 pounds per day or greater, air emissions treatment shall be required.

If both soil vapor extraction and air stripping of recovered groundwater are operated on a site, it is generally appropriate to use the air emissions control device on the soil vapor extraction system first. Treating the vacuum extraction air emissions alone will generally reduce total air emissions to less than 15 pounds per day of VOCs. The air emission control shall continue until subsequent samples demonstrate the vapor emissions are less than 15 pounds per day.

Nuisance considerations

Notwithstanding the evaluation process described above, the RAP shall consider the location of the air emissions sources relative to receptors in the vicinity which could result in odor nuisance, or health concerns due to the direct proximity to the emissions source. If necessary, the RAP shall include recommendations for equipment location, additional exhaust stack height or air emissions treatment to address such concerns.

Alternate Air Emissions Evaluation Methods

The pounds/day of VOCs method to determine the need for air emissions treatment is the preferred method. If this evaluation results in a determination that air emissions control equipment is necessary, a supplemental evaluation of ambient air impacts based on plume dispersion modeling may be performed for verification prior to a final decision to provide an air emissions control device. The procedures in Attachment A shall be followed to make this demonstration.

Listed below are the ambient reference concentrations (ARCs) developed by the Division of Air Resources Management (DARM) for some of the petroleum constituents. This table includes both a column for 24 hour ARCs and a column for annual ARCs.

The 24 hour ARC is derived from occupational exposure levels such as the PELs set by OSHA or Threshold Limit Values that are based on the American Conference of Governmental Industrial Hygienists (ACGIH). The DARM has derived an equation to determine the 24 hour ARC values for different petroleum constituents. The equation is: TLV/420 = 24 hr ARC. Please note that these values are only utilized for short term exposures. Any type of air emissions which occur over a longer period of time should be evaluated based on the estimated annual average ambient concentration and compared against the reference values in EPA's Integrated Risk Information System (IRIS) database. Since five years will be the determining factor on whether an air permit is required, the Department will utilize the five year period as a cutoff between the use of a 24 hour ARC or an annual ARC. Any remedial action plan which estimates air emissions over a five year period should use the annual ARC values.

The TSCREEN Model will provide a 1 hour concentration as the default output. This model can also convert to a 24 hour concentration. Therefore, when a Remedial Action Plan proposes an air emission of less than five years, the model output for a 24 hour emission can be compared directly to the table shown below. However, if the Remedial Action Plan estimates air emissions over five years, the TSCREEN model does not convert from a 1 hour average to an annual average. Therefore one must use a conversion factor from a 1 hour average to an annual average and hand calculate these numbers. This conversion factor is 0.08.

This table does not include a 24 hour ARC for MTBE or an annual ARC for naphthalene. One should substitute the value provided and compare this value to that calculated from the TSCREEN model. For example, the 24 hour ARC for MTBE should be 3000 ug/m3 and the annual ARC for naphthalene should be 119 ug/m3.

With the exception of naphthalene, the polynuclear aromatic hydrocarbons (PAHs) were not included on this table because: (1) There are only two ARC values available; (2) All of the PAHs are semi-volatile organics with a relatively low Henry's Constant. Therefore, the PAHs emitted to the air should be of a low magnitude; (3) The concentrations of PAHs discovered in the soil or the groundwater are typically less than 1 ppm (1000 ppb).

CHEMICALS	24hr ARC ug/m3	annual ARC ug/m3
benzene	7	0.12
1,2-Dicholroethane	95	0.038
1,2-Dibromoethane (EDB)	71	0.0045
MTBE	----	3000
ethylbenzene	1033	1000
naphthalene	119	----
toluene	448	400
xylene	1033	80

JMR/HLR/h

Attachment

ATTACHMENT "A"

MODELING OF AIR EMISSIONS

The Department recommends the use of TSCREEN when determining the appropriate stack height of an air emission and whether air emission controls can be removed from a source of air emissions

Purpose of TSCREEN

TSCREEN is an easy-to-use, interactive, menu-driven, point-source screen model. The purpose of TSCREEN is to quickly and easily screen a point source emission to determine the maximum downwind concentration and the location of this maximum concentration. TSCREEN applies to a continuous point source and includes in the model a built-in worst case meteorology. Worst case meteorology is that combination of wind speeds and stability classes that can physically occur and runs all these cases for the "X" direction. It also uses the standard Gaussian equation, the Briggs plume rise and can consider nearby buildings for downwash, and/or account for fencelines.

Averaging Times

The default averaging time in the TSCREEN model is 1 hour. The maximum concentration can be calculated for additional averaging times selected from the menu. These times include: 15 minutes, 30 minutes, 3 hours, 8 hours, and 24 hours. To associate the ambient reference concentrations (ARC) developed by the Division of Air Resources Management with the results from TSCREEN, one should use the 24 hour averaging time and compare this to the 24 hour ARC.

Model Input

1. Always use 293° K for the ambient air temperature. An estimate should be made of the expected stack exit gas temperature.

2. The flat terrain should be used for sites in Florida.

3. Always use the rural terrain, except if the site is in the center of a large metropolitan area.

4. If a building is within the distance of five times the largest dimension of the building (height, width or length), then the building should be included in the model.

5. If a receptor is within close proximity of the stack (e.g., intake to ventilation system), flagging of this receptor should be included.

6. The receptor height for people standing on the ground should be 0.0.

7. In most cases use a small value (1.0 meter) for the distance to the outside of the site property unless institutional control of site access is possible.

8. The TSCREEN model can only calculate from one source. If there is more than one source one should combine the concentrations and input this data for the more conservative stack (e.g., lower exit temperature, lower velocity, shorter stack), or use the Industrial Source Complex Model.

9. The program will calculate the 1 hour maximum concentration in ug/m3. Use the 24 hour averaging time and compare this result to the ambient reference concentrations provided below. If the results show that the emissions are below ARC at the area of greatest impact, then either the stack

height is appropriate or the air emission control may be discontinued after concurrence from the Department (or local program).

Model Output

The SCREEN model output begins with the times and date that the model was run. Next, there is the model name and version number. Following the model name is the run's title and the user input. Next, the output contains a summary of results showing the maximum concentration and the distance to the maximum. Next, there is a list of concentrations for TSCREEN's automated distances. Finally, there is a listing of the cavity concentrations. Note: cavity concentrations are only listed if the effects of building downwash are being considered. The 24 hour averaging time result is at the end of the model output.

How can TSCREEN be obtained?

TSCREEN can be obtained from the EPA's Support Center for Regulatory Air Models (SCRAM) Bulletin Board System (BBS). The telephone number for access by modem is 919/541-5742.